Missouri Department of Natural Resources

# Water Protection And Soil Conservation Division
# Public Drinking Water Program

## MODEL

## Emergency Operating Plan
## For Public Water Supplies

### Water Source Emergencies - Surface Water

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- Security
- Power
- Telemetry/Controls
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- Contamination
- Screens and Bar Racks
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PUBLIC WATER SYSTEM
MODEL EMERGENCY OPERATING PLAN

## WATER SOURCE EMERGENCIES - SURFACE WATER

The most common problems with a surface water source under emergency situations are:

X loss of power
X loss of telemetry
X structural damage to the intake
X contamination
X loss of raw water transmission
X damage to raw water pumps
X inability to pump due to excessively high or low water levels

## BEFORE THE EMERGENCY (VULNERABILITY ASSESSMENT)

Before an emergency, think about how your intake may not work in an emergency. The questions below should help you find weak areas. Think about what you can do to improve these areas. Some areas can be helped by asking others to borrow equipment. Other areas will need physical improvement. Plan to do these system improvements over the next few years. You need to have a plan for what to do until the improvements are built.

### General

Is your intake and source water susceptible to natural and human-caused hazards such as drought, earthquake, flood, tornado, winter storms, security threats, contamination, or nuclear release?

_____

Where are drawings or information about the intake kept? List building location and the location in the building or use the *Maps* section to list locations. _____

_____

Where is a sketch of how to get to the intake? The *Maps* section is a convenient place to keep these kinds of sketches. _____

_____

Are drawings and information stored above flood levels and in a fire-protected area? _____

_____

What is the lowest elevation you can pump from? _____
What is the highest elevation you can pump from? _____
What is the elevation of the road to the intake? _____
How will you get to the intake in a flood or other emergency? Access by boat? _____

_____

Do you have alternative routes? _____
Where are boats and 4-wheel drive vehicles kept? _____
Do you have alternative raw water sources or multiple intakes?

_____
Are emergency water supply interconnections with other water utilities in place?
_____
_____
If intake is damaged can water be pumped via bypass?
_____
Are dams visually inspected to identify potential problems of ground movement? _____
Are the grass surface moved and brush removed to aid visual observations of the dam? _____
Are drain systems in and under embankment and dams maintained to prevent liquefaction and assure stability particularly during an earthquake? _____
Are embankment dams installed with dense clay with gentle slopes and adequate freeboard? ___
_____

**Security**

Are restricted areas posted with "Employees Only" or Restricted Area" signs?
_____
Is access to intake/river/dam/reservoir restricted by fence, locked gates, structure, alarms or other physical barrier? _____
Are only authorized personnel given access keys or codes for locked facilities? _____
Who has keys to locked facilities? _____
Are locks tamper-proof? _____
Where are duplicate keys or codes located? _____
Is adequate exterior or interior lighting in place? _____
Is intake/river/dam/reservoir monitored? _____
By utility staff / intrusion alarms / television monitors? _____
Does staff vary security checks to the intake/river/dam/reservoir to avoid predictable patterns?
_____
If alarm is activated, what is the response plan? _____
Do local law enforcement personnel perform regular security checks? _____
Are local homeowners/landowners aware of need for security with telephone number(s) to call to report suspicious behavior? _____
Are procedures in-place when specific security threats are issued by local/national law enforcement authorities? _____

**Power**

What are the power sources? _____
Have you coordinated with electric utility for priority feed to the intake? _____
Do you have an emergency generator that can be used for the intake pumps? _____
Where is this generator stored? _____
Are generators exercised regularly?
_____
Who knows how to operate the generator? _____
Where are the directions (operating manual) for the generator? _____
Where is the fuel kept? _____
Where do you buy fuel? _____
Where can you get a generator if you do not have one? _____

Where are the electric lines? _____
Where is the meter for the intake? _____
Are the meters below the 100 or 500-year flood level? _____
Is the substation feeding the intake in the 100 or 500-year floodplain? _____
Have you talked to the power company about how they will supply power during a flood? _____
How will they supply power? _____
What electrical equipment is below the 100 or 500-year flood level? _____
How will you protect this equipment from flooding? _____

**Telemetry/Controls**

Are controls automatic and/or by telemetry? _____
How will the intake be controlled if telemetry is lost? _____
If you will need to control the pumps locally, how will you get to the intake? _____
_____
Are SCADA system sensors operational and tested? _____

**Structures**

Is the intake structure constructed of fire-safe building material?
_____
Is reinforced masonry and other hazard-resistant construction used? _____
Does the intake structure have flood protection? _____
How will you protect the structure from floods? _____
Will you need sump pumps to keep all or parts of the intake dry? _____
Where can you get a sump pump? _____
What elevation are drains? _____ windows? _____ and doors? _____
Are these elevations above the 100 or 500-year flood level? _____
_____

**Contamination**

Contamination of a surface water supply is generally known before the contamination gets to an intake. How fast can you shut down the intake if you are warned of contamination? _____
How will you accomplish this shut down? _____
_____
Do you have automated or real-time monitoring equipment? _____
Do you monitor pH, turbidity, total and fecal coliform, total organic carbon, ultraviolet absorption, color and odor of source water? _____
Is a contamination monitoring system in place, operational and tested?
_____
What will you do if there is a security threat/violation? _____
Is there chemical feed at the intake? _____
How will the chemical feeder be controlled if there is a loss of telemetry? _____
What happens if the chemical feed quits? _____
How will you deliver chemicals to the intake if the roads are inaccessible? _____
What will you do if there is a chemical overfeed or a chemical spill? (see Appendix J for chlorine or Appendix K for other chemicals) _____

**Screens and Bar Racks**

How are the intake screens or bar racks cleaned? _____

If hydraulic means are used, will they work at high water associated with flooding? _____

How will you clean the screens or bar racks if high water prevents backwashing? _____

_____

**Pumps**

Are the pump motors above the 100 or 500-year flood level? _____
If they could be flooded, how do you plan to protect the motors from flood waters? _____
_____
Are the pumps protected from flood water and debris? _____
How will you protect the pumps from debris? _____
_____

**Transmission Piping**

How many pipelines come from the intake? _____
Is there redundancy in the system? _____
Are there isolation valves on each line? _____
Where are the isolation valves? _____
Are the isolation valves marked on any drawings? _____

How will valves be located and operated during high water or when covered with debris? _____
_____
Are there air or vacuum valves? _____
What are the elevations of the valves? _____
Can they be flooded, letting sand and silt clog the valve and get into the raw water line? _____
_____
How will you protect the air and vacuum valves? _____
What are the elevations of the control valves? _____
Are the valves and valve pits protected from flooding and tampering? _____
How? _____
Are valves regularly operated and maintained? _____
Is piping flexible to allow for ground movements? _____
Are piping buried below the frost depth (typically 3 feet for Missouri)? _____
Are valves, sleeves, clamps and piping spares available for an emergency? _____
Are piping adequately setback from sewer lines or other sources of contamination? _____
_____

**Watershed**

Describe the watershed: _____
_____
_____
What businesses or other operations in the watershed could cause contamination? For example a hog operation could cause high coliform or a farmer storing pesticides could cause chemical contamination. _____
_____
_____
What happens if these operations flood? _____
_____
How will you know if any of these operations cause contamination? _____
_____

**DURING THE EMERGENCY**

The damage assessment form at the end of this section can be used to evaluate the condition of the intake during an emergency.

Always check for safety before doing anything!

What needs to be done in an emergency:

X If unauthorized intrusion is evident, notify law enforcement, determine type of security threat and respond accordingly.

X Coordinate alternative water supply if necessary.

X Increase sampling efforts if contamination is threatened.

X See the treatment responses for various contamination in *General Procedures for Specific Emergencies* under Contamination.

X Know current flood level and the predicted flood crest.

X Compare elevations of intake and equipment in the intake to the predicted flood levels.

X Sandbag or take other protective measures before flood levels threaten the intake.

X Make sure power will be available during any emergency.

X Get generators if they will be needed. The emergency form lists where to get generators. There is also information in Appendix D.

X Get extra chemicals if roads or bridges will be inaccessible.

X Move pump motors and other equipment if possible to prevent damage.

X If you quit pumping because of high water, seal air and vacuum valves and valve pits.

X Get boats or 4-wheel drive vehicles if they might be needed. The emergency form lists where to get these. There is also information in Appendix G.

X If flood waters are going to overtake the intake, shut off all power and remove or elevate as much electrical equipment as possible.

X Call MDNR for advice and to tell them what is happening. (Phone number is on emergency form and in Appendix A.)

X If an emergency is threatening the intake, get another water supply. The emergency form should list where you can get tank trucks and potable water or where you can get bottled water. If the sources you prepared for in advance are not available, use Appendix H to find another source.

X Call MDNR and tell your customers about the need or possible need for using another supply.

X Keep track of all emergency related labor hours and work repairs performed. Take pictures of all damaged to facilities and building contents.

## AFTER THE EMERGENCY

The first thing to do after an emergency is check the condition of the intake structure, pumps, raw water pipelines, dam and reservoir. A form for damage assessment is at the end of this section.

When doing a damage assessment, always check for safety before going into a building, driving to the intake/dam, or getting out of a truck or car.

The damage assessment should cover:

X security
X power supply
X controls
X intake building
X intake screens
X raw water pumps
X pump motors
X chemical feed
X raw water pipeline.

Once damage assessment for the entire system has been done, repair work can be prioritized and repair work can begin.

Repair work may include:

X security enhancements
X cleaning and refurbishing electrical gear that was submerged
X cleaning and fixing intake screens
X cleaning pumps of debris
X fixing breaks in the raw water line
X cleaning valves of debris, silt and sand.

If you suspect contamination at the intake (the water has a chemical smell, for example), shut off the intake and call MDNR (phone number on emergency form). If contamination has progressed to the treatment plant or beyond, notify customers immediately. If the contamination can be isolated from parts of the system using valves, close the necessary valves to prevent spreading the contamination and notify customers of the shutoff.

After the emergency is over, damage are assessed and repairs are complete, apply for financial assistance (see Appendix N).